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The Surgery of Gastric Ulcer, with the Report of a Case of Gastrolysis

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THE SURGERY OF GASTRIC ULCER, WITH THE REPORT OF A CASE OF GASTROLYSIS.[1]

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GASTRIC ulcer is a disease so amenable to treatment in the vast majority of cases that it has been considered an affection almost exclusively within the domain of internal medicine. It has long been recognized that in a small percentage of cases from 1.2 to 13 per cent. variously estimated, the very fatal complication of perforation occurs, which could only be met by surgical intervention, but there are a number of other conditions which justify surgical interference, and it is the purpose of this paper to call attention to some of them. Moreover, it is a more common disease than is generally supposed to be the case; according to Ewald it affects from four to five per cent. of the whole population. Although three-fourths of all ulcers heal spontaneously, the conditions which give rise to ulcer, or follow it, often lead to serious complications which cannot be relieved by internal medication. These conditions form a chain of evils whose sequence is not entirely clear, but which seem more or less intimately connected with one another. They resemble that group of symptoms seen elsewhere following obstructions, and recalling in some cases, without great stretch of imagination, those attending enlargement of the prostate gland. We have imperfect emptying of the stomach, dilatation, a change in the

[1] Read before the Boston Society for Medical Improvement, May 16, 1898.

chemical products secreted, hyperacidity and ulceration with its attendant sequelæ, inflammation and hemorrhage.

Whether pyloric stenosis precedes or follows ulceration is not always clear. The great susceptibility of the pylorus to reflex irritation is the cause of a great variety of diseases of the stomach, and also of the persistence of the anatomical lesions which accompany it. (Comte.)

The intimate association of pyloric spasm with ulcer has suggested the possibility that the former is the primary affection. The theory is at least generally strengthened by the fact that operations directed towards relief of spasm and of obstructions have a most beneficial effect upon the whole group of morbid processes.

At all events, with the development of ulcer we find either a spasm of the pylorus which subsequently becomes a permanent stricture due to inflammatory infiltrations, or the cicatricial contractions of a pyloric ulcer may cause organic stricture. In many cases a fold or bar is found at the pyloric neck of the stomach, around the edge of an ulcer, and exerts a valve-like action at the pylorus.

It is, of course, not always necessary that mechanical obstruction should exist to bring about dilatation of the stomach, as that organ is so constituted that a primary or atonic dilatation can develop to such a point that all the conditions of a stenosis of the pylorus may be produced.

We have then a sort of vicious circle of events in the spasm or stricture of the pylorus, hyperacidity and ulceration, which are the prominent factors in the group of symptoms of this affection, and it is among the complications of this complex condition that we find the indications for surgical interference.

Even under the most favorable combination of

circumstances, namely, the healing of the ulcer, we find subsequent cicatrices, which as the cause of pyloric stenosis may give rise to serious interference of nutrition, and may pave the way to a grave cachexia such as phthisis.

The occurrence of cancer in the ulcer or its cicatrix is not a very rare event. According to Comte four to nine per cent. of cancers of the stomach have been preceded by ulcers as a preliminary stage. Carcinomatous degeneration of ulcer or its scar is said by Hauer to occur in six per cent. of all cases of ulcer. Doyen thinks that Comte's figures are too low and regards as one of the greatest triumphs of stomach surgery, not the removal of cancer, but the cure of non-malignant affections which may eventually give rise to it.

The mortality of ulcers of the stomach is rated by some as high as 28 per cent.; on the other hand, of 556 cases treated by Leube medically, 12 died, or 2 per cent.; of these, 8 per cent. died from hemorrhage and 1.2 died from perforation. Surgical treatment according to this author is indicated in only about 4 per cent. of all cases.

Statistics given by various authors vary so greatly that it is hardly worth while to repeat them here, but if we take into account the various complications above mentioned, we find, according to Mikulicz, that the mortality of this disease rises to quite an appreciable figure, 25 to 30 per cent., and it begins to be apparent that among this pretty large remnant of fatal cases there are a not inconsiderable number which might be saved by surgical intervention provided always an operation can be found that will break the vicious circle and restore a normal physiological condition.

The principal conditions under which surgery may become necessary are perforation, hemorrhage, persistent spasm of the pylorus with its attendant pain

and dilatations and, finally, perigastritis with the formation of adhesions and abscess.

The conditions demanding operation prevail according to Leube in about four per cent. of the cases.

The operations which have been most frequently employed for the relief of these conditions are resection of portions of the stomach or pylorus, gastro-enterostomy and pyloroplasty.

Statistics given by Mikulicz show that in a collection of 238 of these three operations, the mortality previous to the end of 1890 was quite high, namely, 48.1 per cent.; but that between 1895–7 it had fallen to 10 per cent., owing doubtless to greater experience and improved technique. They also show another interesting fact, that previous to 1891 resection was most frequently performed and pyloroplasty least frequently, but that the figures had gradually changed so that at the present time the order was reversed, and that resection being the most dangerous of the three was less and less resorted to, and pyloroplasty and gastro-enterostomy in about even numbers had been the operations usually adopted, having almost one-half the percentage of mortality as resection.

It will be seen from these figures that surgical procedures of this kind are not more dangerous to life than the disease itself when allowed to run its course.

Let us now turn for a moment to the conditions which demand surgical operation: we find, first, perforations of the ulcer, about which there has never been any doubt as to the propriety of interfering in spite of the many fatal cases. The only chance of a favorable result appears to exist when the stomach is empty at the moment of perforation, and then only when the operation is performed within ten hours. Under these circumstances, according to Leube, about one-quarter of the cases are saved.

According to Weir and Foote the mortality of operated cases of perforation is 71 per cent. Of those operated upon in the first twelve hours it is only 39 per cent., but between twelve and twenty-four hours, the percentage of mortality rises to 76 per cent.

The perforation may take place into the free abdominal cavity and then produces a general septic peritonitis, a most desperate condition. It is, however, interesting to know that at least a dozen cases are on record in which recovery has been perfect though an undoubted perforation has occurred (Weir). Fortunately as the ulceration nears the surface a protective perigastritis is usually set up, and what in some cases causes an independent complication, necessitating a special operation for its relief, is here a safeguard against general infection. The localized peritonitis brings about firm adhesions and walls off the general peritoneal cavity. It is under such circumstances that the small numbers of spontaneous cures reported take place. This condition more frequently leads to abscesses (sub-phrenic or elsewhere). According to Debove and Renault, the following is the relative frequency of the seat of perforation, — anterior wall 85 per cent., cardiac extremity 4 per cent., lesser curvature 18 per cent., pylorus 10 per cent., posterior wall 2 per cent.

Perforation in the anterior wall is less liable to be protected by adhesions than elsewhere. Fortunately under the skilful treatment of Leube this fatal complication has been reduced to 1.2 per cent. Needless to say that although some advise waiting for the first shock of the perforation to subside, the operation should be performed at the earliest possible moment.

As to the choice of operation, an attempt might be made in favorable cases to resect the ulcer, but suture is more rapid and less liable to increase shock. The

particular method employed would depend upon the circumstances of each individual case.

The next most serious complication is hemorrhage. According to various authors fatal hemorrhage occurs in 3 per cent. to 5 per cent. of the cases, but in Leube's statistics, made up from 556 cases treated by himself, there was only 0.8 per cent. deaths from this cause. Hemorrhage is, however, one of the most common complications of ulcer and it accordingly becomes an important question to determine which are the cases adapted to surgical interference. It is of course only in cases which threaten life that the surgeon would advise operation. Even cases of profuse hemorrhage often get well under medical treatment. It would therefore be well to wait to see if under a proper treatment the hemorrhage might not stop. A second or third bleeding would bring the patient into a condition unfavorable for operation, and it is under these circumstances that the surgeon is usually called upon to operate. Lindner justly says, "If the surgeons cares for his statistics in these cases he will not operate; if he wishes to give his patient a chance for life he will." Fortunately profuse hemorrhage kills in less than one per cent. of the cases. It is only by experience that one can learn when to interfere in such a condition.

The indications are much clearer in cases of frequent small and persistent bleeding extending over a period of weeks or months until the patient is gradually reduced to a condition of fatal anemia. Here it is generally agreed that when medical treatment fails to prevent recurrence a surgical operation should be performed.

In cases of profuse hemorrhage it is justifiable to attempt to find the bleeding vessel and tie it, thus following out the surgical law in regard to hemorrhage.

Attempts have been made to do this in numerous cases, but usually without success. The bleeding vessel, it appears, is most frequently either the superior coronary artery, or one of the large arteries in the pancreas, to which organ the stomach has attached itself. In the latter case the vessel is a branch of the celiac axis. More rarely the bleeding point comes from the splenic artery. Mikulicz reports only two cases in which the vessel was found.

In one case the ulcer was seated on the lesser curvature and the bleeding came from the superior coronary artery. Mikulicz excised the ulcer and sewed up the wound successfully. In many cases there is so much infiltration about the base of the ulcer especially when it is attached to the pancreas, that excision is out of the question. Under such circumstances the hemorrhage has been arrested by cautery. This operation has, however, not been attended with success, the patient dying either from shock or a recurrence of the hemorrhage. A combination of cautery with gastro-enterostomy, thus obtaining a physiological rest, seems to offer a better chance. Two such cases are reported by Küster with successful result. It has happened not infrequently that no ulcer could be found, or there may be several ulcers, and it is then difficult if not impossible at times to determine the bleeding point. Under these circumstances gastro-enterostomy or pyloroplasty are the operations to be selected. Lindner recommends circular or segmentary resection of the ulcer when it can be performed as a more radical method of cure because sewing the ulcer or the cautery are mere temporary procedures. Care must be taken, however, not to make a stricture of the stomach, and in case of any doubt a gastro-enterostomy may also be necessary.

Another direct complication of the ulcer itself is

pain of an intense character and persistent vomiting. It is only in extremely rare cases that an operation would be indicated. Either gastro-enterostomy or resection of the ulcer are the operations to be employed.

A case of this class came under the observation of the writer some fifteen years ago. The prevailing symptom was pain lasting over a great number of years, the patient eventually becoming addicted to large doses of morphine given subcutaneously. Death finally occurred, with symptoms of profound anemia, and a large ulcer with extensive perigastritis was found near the pyloric orifice. An operation may be indicated in extreme cases of recurring ulcers.

The sequelæ of ulcer comprise conditions already referred to, namely, dilatation of the stomach from atony or as the result of pyloric stenosis and perverted secretion consisting in an increase of hydrochloric acid. These constitute conditions extremely unfavorable for the healing of ulcer. The spasmodic contraction of the pylorus and the dilatation of the stomach cause a constant pulling upon the borders of the ulcers, while the increased acidity favors ulceration rather than granulation. The presence of the ulcer, on the other hand, tends to aggravate the stenosis, which is often partly functional. There is, in fact, the same mutual reaction that we see in a paralyzed or obstructed bladder. The same principles of treatment apply, therefore, to both. The obstruction must be relieved and physiological rest given to the organ if possible.

Experience shows that this symptom is attended with beneficial results in the case of the stomach. After the operations of pyloroplasty or gastro-enterostomy the movements of the stomach return in a few months, and the secretions often return to normal. If an ulcer is still present the symptoms of it disappear. Gastralgia and dyspepsia are relieved, the patients lose their

distress, gain flesh and appetite, and become well again.

Of operations for the relief of stenosis, there are three which possess considerable merit, and may be considered here: resection of the stomach, gastro-enterostomy and pyloroplasty.

Resection of the pylorus is the most radical operation, but is not held in so great favor as the other two, as its mortality is still high.[2] Compte reports 17 cases of resection for ulcer, with five deaths. Moreover, the size and situation of the ulcer do not always permit of this operation. It is manifestly more suited to ulcers near the pyloric orifice. A large ulcer, with adhesion, would make the operation still more formidable. Not infrequently an adjoining organ may form part of the base of an ulcer. Resection is indicated when there is any uncertainty as to the presence of cancer, and inasmuch as cancer follows not infrequently upon ulcer, this operation gives a measure of safety for the future which is not obtained by other methods.

Excision of the ulcer is suitable for small ulcers, particularly those in the anterior wall where perforation is liable to occur. It may also be combined with other operations. In two instances Mikulicz excised the ulcer and stretched the mucous membrane before performing pyloroplasty. This can be done if the ulcer is easily accessible through the incision made for the operation.

Pyloroplasty is a comparatively safe operation, but it is indicated only in cicatrices of the pylorus without

[2] In a collection of 234 cases of benign stenosis and ulcer the following rate of mortality was found by Mikulicz to exist: —

Resection	27.8%
Gastro-enterostomy	16.2%
Pyloroplasty	13.2%
Combined	16.1%

adhesions. It is contraindicated when there are adhesions and when there is an open ulcer near or in the pylorus. If successfully performed, there is also some danger of subsequent stenosis. As a scar is left at the pylorus the cicatricial process previously existing may still go on. Theoretically, it restores the physiological conditions more perfectly than gastro-enterostomy.

Gastro-enterostomy, when successfully carried out, is a most efficient drain for the obstructed and distended stomach. It, moreover, gives physiological rest to that portion of the stomach which is in a state of muscular activity during the digestion. The suggestive diagrams of Cannon [8] show how active this is in certain animals. It is here, moreover, that we find most of the ulcers. By this operation we keep empty the atonic and dilated viscus and switch out of the digestive circuit the diseased bowel. This operation has many enthusiastic supporters, among them Doyen, who reports 21 cases, *all* of which were successful. There is one serious drawback to it. After the jejunum has become attached to the stomach, a spur is occasionally found which prevents the stomach's contents from flowing into the efferent bowel. The contents find their way consequently into the afferent bowel, and return again to the stomach, a vicious anatomical circle thus being established. As a result of this complication the stomach cannot empty itself, and uncontrollable vomiting sets in. The patient usually succumbs at the end of one or two weeks after the operation, and a post-mortem examination shows an enormously distended stomach and duodenum and an empty jejunum.

This mechanical difficulty can be overcome by cutting through the spur and establishing communication

[8] Harvard Physiological Laboratory.

between the afferent and efferent intestine. An entero-anastomosis performed in this way is the only sure method of overcoming the difficulty. In case there is great atony of the stomach it might be desirable to forestall this complication and perform gastro-enterostomy and entero-anastomosis of the attached jejunum simultaneously.

Loreta's operation or digital dilatation of the pylorus and gastroplicatio or taking a fold in the dilated stomach are operations which are less frequently performed at the present time. Loreta's operation does not seem to ensure against a relapse of the stenosis and gastroplicatio, although diminishing the size of the stomach does not relieve the stenosis or restore the atonic condition of the muscular walls.

Perigastritis is a condition which accompanies ulcer when the ulceration approaches the parietal peritoneum. It may be of all degrees of severity. There may result very slight adhesions to the abdominal walls, or they may be so extensive as to fasten portions of the stomach to other organs and form a perceptible tumor which can be felt through the abdominal wall. Finally, it may be the forerunner of suppurative processes and subphrenic abscess.

The symptoms of perigastritis are: cardialgia, boring pains, vomiting, hyperesthesia combined with dilatation of the stomach, localized tenderness on pressure, usually in the epigastrium or hypochondrium. In perigastritis postica there may be tenderness in the lumbar regions near the first or second lumbar vertebra. Perigastritis may be suspected where treatment fails to relieve the symptoms of ulcer. The pain resembles somewhat that observed in hernia epigastrica.

These symptoms are brought about by the anchoring of portions of the stomach, so that during the

change in volume of the organ and its muscular movements the adhesions are pulled upon. Occasionally they are torn and lacerated by the movements of the abdominal wall. Recurrent attacks of inflammation may be set up in this way.

The operation which has been devised for the relief of this complication is eminently successful and is called gastrolysis. It consists simply in breaking up the adhesions. In the milder types of this affection the operation may be almost a trivial one, but when accompanied by ulcer, other operations directed to the relief of the ulcer must be performed simultaneously. In some cases the simple breaking up of even extensive adhesions is followed by the most satisfactory results. Quite a number of these cases are recorded. Thus Robson operated in 1893 in two cases of adhesion of the stomach with dilatation. There was adhesion to the abdominal wall and under surface of the liver. Ferrier performed a similar operation on a woman sixty-two years of age for adhesions on lesser curvature to liver and abdominal wall.

Mikulicz reports several cases of gastrolysis and also eight in which the infiltrated portion of the stomach wall and the ulcer were resected — all successful.

Finally, there remains the so-called hour-glass stomach produced by cicatricial stenosis in the continuity of the stomach.

There are two operations suited for the relief of this condition. The first of these is gastroplasty analogous to pyloroplasty. The second is a gastro-anastomosis, which consists in the junction of the two halves of the stomach through a wide opening. A striking example of this method was the most successful operation of Watson.

The following case of perigastritis was treated by the operation of gastrolysis. The opportunity of

operating upon and reporting the case was kindly given me by Drs. Anthony of Bradford, and Clarke of Haverhill. The operation was performed at the Haverhill Hospital with the assistance of Drs. G. C. Clement of Haverhill and my assistant Dr. R. B. Greenough.

The patient, Joseph T. C., married, aged forty-one, was a French Canadian. Little is known about his family antecedents. As a child he had measles and whooping-cough and also croupous pneumonia. He had gonorrhea ten years ago and made a good recovery. Is addicted to a moderate use of alcohol.

He has had chronic dyspepsia and constipation for many years and at certain intervals of time he suffered from paroxysmal attacks of pain in the epigastric region, lasting a few hours.

Some of these attacks were very severe and he is said at these times to have lost consciousness.

There was no history of his having passed any blood in the stools or having vomited blood. No attacks of jaundice at any time.

Two days before entering the hospital on February 18, 1898, he was suddenly seized with great pain in the region of the gall-bladder while at work. The patient fell in great agony, was carried home and later to the hospital. The pain lasted for several hours.

On examining him February 25th, I found a rather emaciated individual of sallow complexion complaining principally of dyspepsia. A tumor existed in the right hypochondrium at the margin of the cartilage of the ribs. On palpation it was hard and ill-defined and seemingly attached to the abdominal wall. There was also dulness on percussion. There was also some pain in the right lumbar region. An examination of the urine was negative.

An incision five inches long was made parallel to

right costal cartilages and about one inch from them. On dividing the abdominal parietes a thick exudation of yellow lymph was observed, beneath which lay the liver, which was thus firmly attached to the parietal peritoneum. On breaking away these adhesions, the edge of the liver could be drawn up exposing the gall-bladder similarly imbedded in light adhesions. Beneath the gall-bladder, which appeared to be normal, there was more extensive exudation in the centre of which the pylorus was imbedded. On its anterior wall was a layer of partly organized blood-clot about one-quarter of an inch in thickness and one by two inches in dimensions. After these adhesions had been broken up palpation failed to detect anything abnormal in the interior of the stomach or duodenum. There was no marked dilatation. After careful walling off with gauze an incision about two and a half inches in length was made in the stomach near the pylorus through which an exploration was made. No ulcer or induration was felt in the stomach, but a cicatricial band at the lower margin of the pyloric orifice narrowed that outlet somewhat so that the forefinger could only with some care be pushed through the constriction. This opening was gradually stretched so as to admit the ring-finger tip. The wound in the stomach was then closed with Lembert sutures. The abdominal wall was closed except one stitch, which was not tied so as to allow a small gauze drain to remain in. The gauze was removed on May 1st and the wound closed. Healed by first intention. The patient was fed on nutrient enemata. Bowels moved on May 4th. Temperature normal since operation. On May 17th semi-solids were given by the mouth. The following week the patient received light house-diet, which caused him no pain or discomfort, and he was discharged "cured" on May 24th.

In order to determine the future of cases of ulcer (and dilatation) of the stomach which have received hospital treatment, Dr. Elliott P. Joslin and Dr. R. B. Greenough have kindly undertaken to obtain for me the histories of 247 cases after they had left the hospital. This group embraces all cases treated at the Massachusetts General Hospital between the years 1888–1898. It is, therefore, practically a study of these cases for an average of five years after leaving the hospital, and gives, therefore, what is equivalent to end results in a large number of cases. Although from an examination of the Hospital Records it would appear that only 43 of the 187 cases of ulcer were discharged from hospital in any other condition than "well" or "much relieved" (22.8 per cent.) it is seen from these statistics that 54 cases in 110 in which we have been able to obtain reports were not permanently relieved by their treatment. Probably a similar examination of Leube's cases, referred to above, might show less favorable results than he reports.

Of the 187 cases of ulcer, the following came under the head of those probably suitable for operation:

Perforation	6 (1 operated)
All died (1 of renal disease).	
Hemorrhage	5 (2 operated)
Cancer developed	3
Stenosis with dilatation	13
	27 or 14 per cent.

This list does not include cases of relapse after treatment, of which there were 39.

Of the 37 cases of dilatation that reported, 28 cases or 76 per cent. were not permanently relieved. Of the 60 cases of dilatation, those probably suited to operation were

Deaths from cancer	7 (0 operated)
Not cured	18 (1 operated)
	25 or 41 per cent.

Doubtless as our knowledge of the conditions which develop during this disease becomes more thoroughly crystallized, it will be found that a much larger proportion of the cases than is supposed are not amenable to medical treatment, and that symptoms may be relieved and future complications prevented by a surgical operation.